# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/046,590 | 10/29/2001 | Ilan Sutskover | 844.430US1 | 4168 |

| 21186          7590          06/27/2005 | EXAMINER |
|---|---|
| SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402-0938 | PHU, PHUONG M |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2631 | |

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/046,590 | SUTSKOVER ET AL. |
| | **Examiner** | **Art Unit** | |
| | Phuong Phu | 2631 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 December 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-32* is/are pending in the application.

　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14-18 and 20-30* is/are rejected.

7)☒ Claim(s) *12,13,19,31 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

　　a)☐ All   b)☐ Some * c)☐ None of:

　　　　1.☐ Certified copies of the priority documents have been received.

　　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.

　　　　3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
　　　　　　application from the International Bureau (PCT Rule 17.2(a)).

　　* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date *3/25/02, 12/1/03*.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

## DETAILED ACTION

### *Specification*

1.      The abstract of the disclosure is objected to because it has less than 50 words.  Correction

is required.  See MPEP § 608.01(b).

2.      Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a
separate sheet within the range of 50 to 150 words.  It is important that the abstract not exceed
150 words in length since the space provided for the abstract on the computer tape used by the
printer is limited.  The form and legal phraseology often used in patent claims, such as "means"
and "said," should be avoided.  The abstract should describe the disclosure sufficiently to assist
readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the
title.  It should avoid using phrases which can be implied, such as, "The disclosure concerns,"
"The disclosure defined by this invention," "The disclosure describes," etc.

### *Claim Rejections - 35 USC § 103*

3.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains.  Patentability shall not be negatived by the
> manner in which the invention was made.

4.      Claims 1-11, 14-18 and 20-30 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Forney, Jr. (4,933,956) in view of Sklar, "Digital Communications Fundamentals and

Applications", published by Prentice Hall PTR, year 2000.

-Regarding to claims 1, 14, see figures 24 and 25 and col. 25, line 64 to col. 26, line 68,

Forney, Jr discloses a method and associated system comprises:

step/means (505) of performing iterative decoding on encoded input signal (r) to estimate a codeword ($X_1$, ..., $X_n$) associated with the encoded input signal, said codeword being within a base cell of an underlying lattice (see col. 25, line 64 to col. 26, lines 46-68), and

step/means (507) of determining a cell translation ($X_{n+1}$) associated with said encoded input signal based on said codeword.

Forney, Jr does not disclose determining prior probabilities associated with the encoded input signal and performing the iterative decoding on said encoded input signal, using said prior probabilities, to estimate the codeword, as claimed.

Forney, Jr discloses that said iterative decoding can be implemented with a maximum likelihood decoding technique (see col. 26, lines 52-56).

Sklar teaches a maximum likelihood decoding technique which performs determining prior probabilities (e.g., $P(Z|U^{(m')})$, $p(z|s_1)$, $p(z|s_2)$) associated with an encoded input signal (Z); performing iterative decoding on said encoded input signal, using said prior probabilities, to estimate a codeword (e.g., $s_1$ or $s_2$) associated with said encoded input signal (see page 395, lines 3-20).

Since Forney, Jr does not teach in detail how the maximum likelihood decoding technique is implemented, it would have been obvious for one skilled in the art to implement Forney, Jr in such a way that step/means (505) would determine prior probabilities associated with the encoded input signal and perform the iterative decoding on said encoded input signal, using said prior probabilities, to estimate the codeword, as taught by Sklar so that, such the implementation would enable the maximum likelihood decoding technique to be applied in Forney, Jr invention in view of Sklar.

-Regarding to claims 2, 15, Forney, Jr discloses step/means (509) of mapping said

codeword to an

appropriate cell of said underlying lattice using said cell translation (see figure 25).

-Regarding to claims 3, 16, Forney, Jr discloses that said encoded input signal is coded

with a multilevel code (N-tuple) (see col. 25, line 66 to col. 26, line 12).

-Regarding to claims 4, 17, Forney, Jr discloses that said encoded input signal is coded

with a lattice code (see col. 25, line 66 to col. 26, line 12).

-Regarding to claim 5, Forney, Jr discloses that said encoded input signal is coded with a

code having at least one constituent code $(X_1, ..., X_n))$ (see col. 26, lines 46-68). And further,

as applied for claim 1, in Forney, Jr invention in view of Sklar, step/means (505) inherently

should determine prior probabilities includes determining a probability that a first coordinate

$(X_1)$ of the constituent code based on said encoded input signal.

-Regarding to claim 6, Forney, Jr in view of Sklar discloses that said encoded input signal

has been modified by an interferer (CHANNEL) (see Forney, Jr,, figure 13); and determining

prior probabilities includes determining probabilities based upon statistics associated with said

interferer (channel with Gaussian distribution) (see Sklar, page 395).

-Regarding to claims 7, 22, Forney, Jr in view Sklar teaches that said statistics associated

with said interferer are known (see Sklar, page 395).

-Regarding to claims 8, 23, Forney, Jr in view Sklar teaches that determining prior

probabilities includes assuming statistics for said interferer for use in determining said

probabilities (see Sklar, page 395).

-Regarding to claims 9, 24, as applied to claim 1, in Forney, Jr in view Sklar, said would be assumed to be (Gaussian) uniformly distributed within a cell of an integer lattice . (see Forney, Jr, col. 25 line 66 to col. 26, line 5, and Sklar, page 395).

-Regarding to claims 10, 25, Forney, Jr discloses that said cell is a ball (N-tuple space) (see Forney, Jr, col. 25 line 66 to col. 26, line 5, and also for an clarification of a N-tuple space being a ball,, see Sklar, pages 347-348 ).

-Regarding to claims 11, 18, 20, Forney, Jr in view of Sklar teaches that wherein performing iterative decoding includes (see Forney, Jr, figures 24 and 25):

step/means (505) performing a first decoding iteration, using said prior probabilities, to generate first information ($X_1$); and

step/means (505) performing a second decoding iteration, using said first information, to generate second information ($X_2$).

-Regarding to claim 21, Forney, Jr discloses that said iterative decoding is a soft-decision (i.e., soft-in and soft out) decoder (505) (see figure 25).

-Regarding to claim 26, Forney, Jr in view of Sklar teaches that said interferer has a Gaussian distribution with zero mean and unknown variance (see Sklar, page 395).

-Claim 27 is rejected with similar reasons set forth for claims 1 and 14.

-Claim 28 is rejected with similar reasons set forth for claims 2 and 15.

-Claim 29 is rejected with similar reasons set forth for claims 3 and 16.

-Claim 30 is rejected with similar reasons set forth for claims 4 and 17.

*Allowable Subject Matter*

5.      Claims 12, 13, 31 and 32 are objected to as being dependent upon a rejected base claim,

but would be allowable if rewritten in independent form including all of the limitations of the

base claim and any intervening claims.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Phuong Phu whose telephone number is 571-272-3009. The

examiner can normally be reached on M-F (6:30-2:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for

the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Phuong Phu
Primary Examiner
Art Unit 2631

Phuong Phu
06/23/05

PHUONG PHU
PRIMARY EXAMINER